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Agnieszka FORTOŃSKA<sup>1</sup>

## THE IMPACT OF BIRD STRIKES ON AIR TRANSPORT SAFETY

**Summary.** The author will discuss the bird strike phenomenon and its impact on the air transport of passengers. In addition to the above, examples of flying accidents mainly caused by bird strikes will be provided. Furthermore, the issue of responsibility for accidents caused by bird strikes will be discussed, alongside legal regulations pertaining to subjects connected with the topic.

**Keywords:** bird strike, bird strike responsibility, smash, collision

### 1. INTRODUCTION

A safe and comfortable journey is important to every passenger who selects a mode of transport from Point A to Point B. If air transport is selected, a traveller must take into consideration the fact that, during the flight, an unexpected, sudden, extraordinary and unpredictable event may occur, e.g., clean-air turbulence, a terrorist attack or a bird strike. Such an event may occur both during and whilst awaiting a flight. However, countries and aviation institutions have attempted to prevent any hazards that may cause flying accidents, e.g., by publishing documents regulating the actions to be performed in order to ensure safety at airports and on aircraft:

- The Tokyo Convention, The Hague Convention, The Montreal Convention (international antiterrorist conventions) [1]

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- Annex 14 (Aerodromes) to the Chicago Convention (Volume 9, Recommendations on Collisions with Birds) [2]

At this stage, it should be pointed out that the focus of this article is on only one of the many causes that can cause an accident and thus affect the safety of passenger transport.

## **2. FLYING ACCIDENTS CAUSED BY BIRD STRIKES**

The collision involving an aircraft and a flock of birds (a so-called bird strike) can also be the cause of air accidents or disasters. The first such case was noted in 1912, when the pilot Calbraith Rogers died due to a collision with seagulls. Despite this type of accident, nobody has regulated the safety and prevention of such events in the future. The breaking point was the disaster involving Eastern Air Lines Flight 375 in 1960, when engine failure occurred as a result of a bird strike. Unfortunately, the plane crashed, with 62 out of the 72 people on board being killed as a result of the accident. After this event, recommendations on the course of action with regard to birds present in the vicinity of airports were made, while the Federal Aviation Administration (FAA) decided that this type of incident posed a risk to the life and health of passengers [3]. The most famous case of a bird strike involved US Airways Flight 1549 in 2009 (popularly known as the “Miracle on the Hudson”). Several minutes before landing, the aircraft crashed into a flock of wild geese, which caused damage to its engines and forced the pilot to perform an emergency landing on the Hudson River. Thanks to the pilot’s skills, all the passengers survived the disaster.

Other examples of aviation accidents that took place in 2017, which were caused by a collision between birds and aircraft, are as follows:

- Antonov An-74TK-100 (24 April 2017)
- Cessna 208B Grand Caravan (22 May 2017)
- Beech 99A (29 July 2017)
- Cessna 550 Citation II (24 March 2017) [4]

## **3. STATISTICS FOR FLYING ACCIDENTS CAUSED BY BIRD STRIKES**

Although aircraft accidents caused by bird strikes do occur, air transport is safe and comfortable for passengers in every country.

Considering the above, it should be emphasized that the bird strike phenomenon often occurs in civil aviation. Unfortunately, bird collisions are not always reported by aircraft users, which may affect the overall statistics. Both at the international and national levels, states put emphasis on reporting such events in order to counteract threats resulting from bird strikes and minimize the risk of collisions with birds.

In addition, the collection of statistical data on the types of bird strikes and their occurrence in a given period allow the managing body of an airport to identify dangerous zones and introduce an appropriate bird control programme.

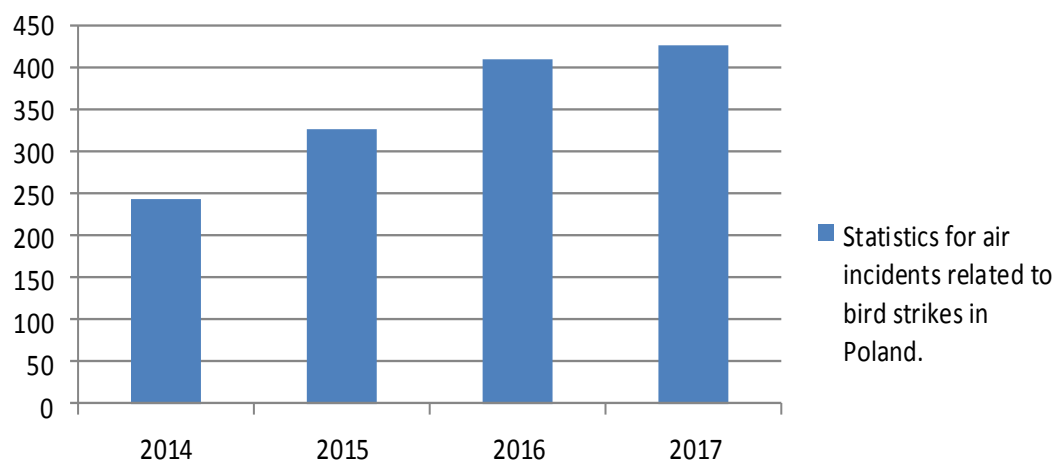


Figure 1. Statistics for air incidents related to bird strikes in Poland (2014-2017)

Source: Own elaboration on the basis of statistics from

[http://www.ulc.gov.pl/\\_download/wiadomosci/01\\_2017/zderzenia\\_ze\\_zwierzetami/03\\_Statystyki\\_zderze%C5%84\\_PKaczmarczyk\\_EPWA\\_2017.pdf](http://www.ulc.gov.pl/_download/wiadomosci/01_2017/zderzenia_ze_zwierzetami/03_Statystyki_zderze%C5%84_PKaczmarczyk_EPWA_2017.pdf)

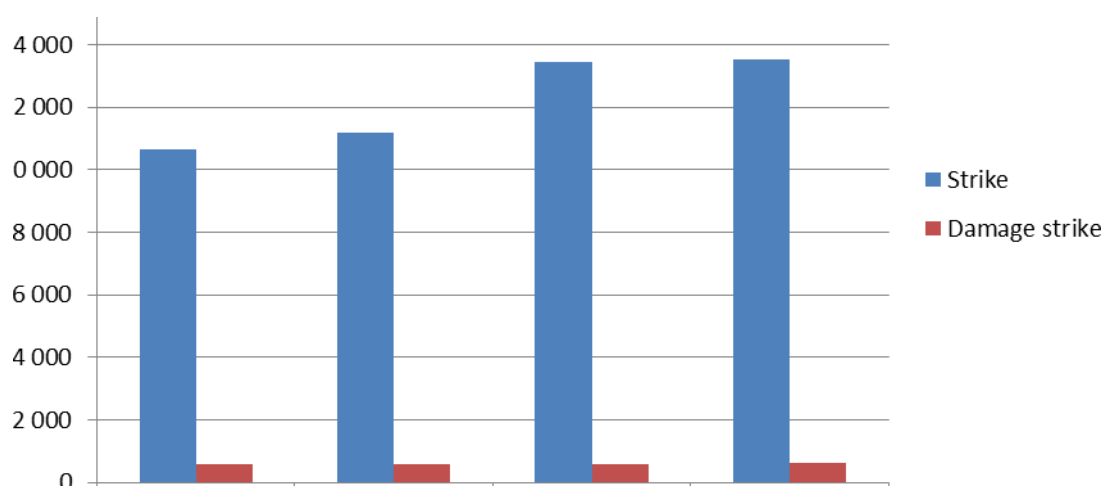


Figure 2. Statistics for air incidents related to bird strikes in USA (2012-2015)

Source: Own elaboration on the basis of statistics from

<https://wildlife.faa.gov/downloads/Wildlife-Strike-Report-1990-2015.pdf>

#### 4. LIABILITY FOR BIRD STRIKE ACCIDENTS

In the event of a bird strike, numerous forms of damage can arise, ranging from damage to the machine (most often engines) and damage to people or property, to (in the worst-case scenario) an airplane disaster, which can cause the death or bodily injury of passengers and third parties on the ground or damage to objects belonging to them. Determining the entity that is responsible for this type of event raises a number of concerns, due to many factors, e.g., the place of the accident, bird species and the flight phase. Those who can be held responsible for the damage are primarily:

- Airport managing bodies
- Air traffic control service entities
- Aircraft operator
- Producer of aircrafts [5]

However, it should be noted that the air carrier operating a given aircraft is the entity liable for passengers and third parties. The airline is responsible for death, personal injury or wounding when circumstances listed in the Warsaw Convention or in Article 17 of the Montreal Convention (“provided that the accident that caused the death or bodily injury occurred on board the aircraft or during any embarkation or disembarkation operations”) occur. Despite the legal basis, it should be remembered that a passenger must prove the damage claimed, while the court must also conclude that the “accident” occurred [6]. Unfortunately, case law in terms of regarding specific events on board an airplane as accidents is non-homogeneous; therefore, qualifying the collision of a machine with birds in this sense is even more controversial.

At this stage, it should be emphasized that the landmark ruling on liability for bird strikes is the judgement of the Court of Justice in the case of Marcel Pešková, Jiří Peška vs. Travel Service a.s. (C-315/15). On the basis of the presented facts, it was stated that passengers cannot claim compensation for flight delays resulting from collision with birds because this is an extraordinary circumstance that exempts the air carrier from the obligation to pay the amounts indicated in Regulation (EC) No. 261/2004 [7]. The justification was based on the argument that collision with birds is not an ordinary, predictable event on the part of an air carrier. In addition, incidents involving birds are not included in the areas covered in [8].

## 5. SYSTEMS REGULATING BIRD STRIKES

In the case of a bird strike occurrence and the incurrence of any damage by passengers or third parties, three systems regulating this issue can be identified. The first refers to occurrences taking place during domestic flights. The provisions of aviation law, including general rules laid down in the relevant civil code, are applicable in such situations. In Poland, liability does not depend on the flight type, as both domestic and international flights are regulated by principles established in international agreements ratified by the country. The same rules apply in the case of flights not governed by such agreements, which start or end in the territory of Poland or in the case of commercial landing in the territory and in domestic air carriage [9].

At the level of the EU, air carrier liability for the carriage of passengers applies to those who:

- Leave an airport situated within the member state.
- Leave an airport located on the territory of the third state, but land at an airport of the member state. Here, we refer to Regulation No. 889/2002 on air carrier liability in the event of accidents [10]. Pursuant to Article 3 of the enumerated regulation, “the liability of a Community air carrier in respect of passengers and their baggage shall be governed by all provisions of the Montreal Convention relevant to such liability”.

In turn, provisions from the Warsaw-Montreal system should be applied when going beyond frameworks of the EU [11]. In particular, it will be necessary to take account of Article 17 of the Montreal Convention, which specifies the circumstances of carrier liability.

An airline's liability for damage suffered by third parties (damage to property, damage to person), which can arise as a result of the landing of an airplane, an airplane disaster or a falling object from an airplane, is a distinct issue [12]. This subject is specified in the Convention for the Unification of Certain Rules Concerning the Damage Caused by the Aircraft to Third Parties on the Ground, which was put forward in Rome on 29 May 1933 (later replaced by the Rome Convention in 1952) [13]. The specified provisions in this convention define air carrier liability by way of risk, even in the case when the airline is not responsible. However, there are circumstances under which the carrier may free itself from liability, but only in the case when the carrier demonstrates that: "damage arose solely through the fault of the injured party or people acting for them or damage is a direct consequence of armed conflict or civil riots, when on the basis of the public authority's decision he was deprived of the possibility to use the aircraft" [14].

## 6. METHODS FOR PREVENTING BIRD STRIKES

Bird strikes are a significant problem faced by civil aviation. Any flight may potentially face the danger of a bird strike if entities obliged to provide safety in that regard fail to take appropriate measures. Within an airport, the airport managing body is in charge of minimizing the risk of a collision of aircraft with birds found in the surrounding area. The methods used by airport staff to repel birds are chiefly: pyrotechnic devices, gas cannons, and lighting or sound effects. In addition, chemicals, traps or trained falcons may be used [15].

In addition, the managing body of an airport may use natural methods for deterring birds, such as:

- Removing vegetation and mowing grass so that it does not exceed 10-20 cm and is not a source of food or a place where birds are hidden
- Drying of water tanks around the airport
- Disposing of rubbish dumps near the airport
- Drawing on the help of specially trained dogs and birds of prey [16]

Although there are many methods by which the risk of airplane collision with birds can be minimized, it must be emphasized that these should not be permanent; rather, they should be used alternately, so that the birds do not get used to the means used.

Currently, such incidents involving ducks or geese are common. Due to the development of new technologies or airports, it is increasing the case that, when planes take off, they produce noise that has an adverse impact on birds that often have their nesting areas near airports. Sometimes, airports are perfect places for resting or feeding for many bird species [17]. The occurrence of bird strikes must be reported to the competent authorities. The International Civil Aviation Organization also collects statistics on such events, while the FAA accepts reports on these types of accident. In the Polish system, the registration of collisions with birds is handled by the Civil Aviation Office. In addition, in 2013, a special committee was set up to act on the basis of Decision No. 3 of the President of the Civil Aviation Office. The scope of its activity includes the exchange of information or familiarization with new technologies used to counteract bird strikes.

ANNOUNCEMENT OF AIR EVENTS RELATING TO BIRDS AND ANIMALS									
Based on: Manual on the ICAO Bird Strike Information System IBIS (Doc 9332) and ICAO Doc 9137 - AN/901 Part III									
Complaining - contact:									
Operator:				1/2		Impact on the flight process			
Type of the aircraft:				3/4		does not affect <input type="checkbox"/> 32 the start was interrupted <input type="checkbox"/> 33 the need for a landing <input type="checkbox"/> 34 stop the engine <input type="checkbox"/> 35 other <input type="checkbox"/> 36			
Engine type:				5/6					
Registration marks:				7					
Date 8		D		M		R			
Time 9				LMT					
A Dawn <input type="checkbox"/>		B Day <input type="checkbox"/>		C Twilight <input type="checkbox"/>		D Night <input type="checkbox"/>		10	
Name of the airport:				11/12		Used DS:		13	
Location:				14					
Height:				ft		AGL		#	
Speed:				kt		IAS		#	
Airport of taking off:				Airport of landing:					
Cruise number / callsign:				Planned kind:					
Flight phase 17		stop <input type="checkbox"/> A taxi <input type="checkbox"/> B start <input type="checkbox"/> C erection <input type="checkbox"/> D flight <input type="checkbox"/> E descent <input type="checkbox"/> F approach <input type="checkbox"/> G roll <input type="checkbox"/> H		unknown <input type="checkbox"/> I		Number of birds / animals passing / running 42      striking 43 1 <input type="checkbox"/> A <input type="checkbox"/> A 2-10 <input type="checkbox"/> B <input type="checkbox"/> B 11-100 <input type="checkbox"/> C <input type="checkbox"/> C more <input type="checkbox"/> D <input type="checkbox"/> D Size of birds / animals 44 small <input type="checkbox"/> S middle <input type="checkbox"/> M big <input type="checkbox"/> L			
Parts of the aircraft		drilled rada <input type="checkbox"/> # <input type="checkbox"/> glass <input type="checkbox"/> # <input type="checkbox"/> beak <input type="checkbox"/> # <input type="checkbox"/> engine 1 <input type="checkbox"/> # <input type="checkbox"/> engine 2 <input type="checkbox"/> # <input type="checkbox"/> engine 3 <input type="checkbox"/> # <input type="checkbox"/> engine 4 <input type="checkbox"/> # <input type="checkbox"/> propeller <input type="checkbox"/> # <input type="checkbox"/> wing/rotor <input type="checkbox"/> # <input type="checkbox"/> body <input type="checkbox"/> # <input type="checkbox"/> chassis <input type="checkbox"/> # <input type="checkbox"/> tail-plane <input type="checkbox"/> # <input type="checkbox"/> headlights <input type="checkbox"/> # <input type="checkbox"/> other <input type="checkbox"/> # <input type="checkbox"/> Bird / animal succed into the engine <input type="checkbox"/> Y		struck <input type="checkbox"/> # <input type="checkbox"/> damaged <input type="checkbox"/> # <input type="checkbox"/> Did the crew prejudice about birds / animals? 45 Yes <input type="checkbox"/> Y No <input type="checkbox"/> X Description of the event / Remarks: 46 / 47 Airport: <input type="text"/> Date: <input type="text"/> Time: <input type="text"/> Accepted by: <input type="text"/>					

Figure 3. Form intended for reporting events involving birds in Poland

Source: <http://www.kolizjezptakami.pl/zglaszanie-zdarzen-z-ptakami>

## 7. SUMMARY

Civil aviation safety is a priority, requiring the involvement of multiple entities and institutions. Air carriers, airport managing bodies and aircraft manufacturers must all ensure that the risk of collisions of birds with planes is minimized. Countries and international institutions are responsible for creating legislation to regulate the procedures for dealing with bird-related air incidents. Moreover, it is important to report such incidents, as this helps to determine the location of areas where birds are present, the types of the birds and the level of

the threat to air transport safety. Unfortunately, even at low flying speeds, the collision with a large bird can cause great damage or even a flying accident.

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